

CLAIMS

1. A door closer that holds a door at a fully closed position by engaging with a prescribed engagement member, wherein, when the engagement member is disengaged from the door closer, the door moves to a released position that is located slightly separate from the fully closed position in a door opening direction, the door closer comprising:

5       a latch, which engages with the engagement member, wherein the latch rotates between an initial position at which the latch receives the engagement member and a fully latched position, and wherein, when the latch rotates from the initial position to the fully latched position after receiving the engagement member, the door is moved to the fully closed 10 position;

15       an urging member, which urges the latch toward the initial position;

20       a ratchet, which is urged toward the latch, wherein, when the latch reaches the fully latched position, the ratchet engages with the latch to hold the latch at the fully latched position;

25       an actuation mechanism, which separates the ratchet from the latch to disengage the ratchet from the latch, wherein, when the ratchet disengages from the latch, the urging member returns the latch from the fully latched position to the initial position such that the engagement member disengages from the latch and the door moves from the fully closed position to the released position; and

30       a detection device, which detects that the door is located at a predetermined position separate from the released position in the door opening direction, wherein the actuation mechanism holds the ratchet at a position at which the ratchet cannot engage with the latch after the ratchet disengages from the latch, unless the detection device detects that the door

is located at the predetermined position.

2. The door closer as set forth in claim 1, further comprising:

5 a motor, which drives the actuation mechanism; and  
a controller, which controls the motor.

10 3. The door closer as set forth in claim 2, wherein the controller maintains the motor in a stopped state after the ratchet disengages from the latch, unless the detection device detects that the door is located at the predetermined position.

15 4. The door closer as set forth in claim 2, wherein the controller controls the motor such that the actuation mechanism disengages the ratchet from the latch in accordance with an external instruction.

20 5. The door closer as set forth in claim 1, wherein:  
the latch rotates from the initial position to the fully latched position via a latching start position;  
the ratchet is a first ratchet;  
the door closer further includes a second ratchet, which is urged toward the latch, wherein the second ratchet engages  
25 with the latch when the latch reaches the latching start position from the initial position; and  
the actuation mechanism moves the second ratchet such that the second ratchet rotates the latch to the fully latched position when the second ratchet engages with the latch.

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6. The door closer as set forth in claim 2, wherein:  
the latch rotates from the initial position to the fully latched position via a latching start position;  
the ratchet is a first ratchet;

the door closer further includes a second ratchet, which is urged toward the latch, wherein the second ratchet engages with the latch when the latch reaches the latching start position from the initial position; and

5       the controller instructs the actuation mechanism to move the second ratchet such that the second ratchet rotates the latch to the fully latched position when the second ratchet engages with the latch.

10      7. The door closer as set forth in claim 6, wherein the controller controls the motor such that the actuation mechanism disengages the second ratchet from the latch in accordance with an external instruction.

15      8. The door closer as set forth in claim 2, wherein the actuation mechanism includes a rotary body driven by the motor and a rotational position sensor that detects a rotational position of the rotary body, and the controller controls the motor in accordance with the rotational position of the rotary body detected by the rotational position sensor.

20      9. The door closer as set forth in claim 8, wherein the rotational position sensor includes a conductor that is located on the rotary body to form a predetermined conductive pattern on the rotary body and a plurality of contact elements that contact the conductive pattern, and the controller determines the rotational position of the rotary body in accordance with signals from the contact elements.

25      30     10. The door closer as set forth in claim 1, wherein the detection device is a contact type switch.

11. A door closer that holds a door at a fully closed position by engaging with a prescribed engagement member,

wherein, when the engagement member is disengaged from the door closer, the door moves to a released position that is located slightly separate from the fully closed position in a door opening direction, the door closer comprising:

5        a latch, which engages with the engagement member, wherein the latch rotates between an initial position at which the latch receives the engagement member and a fully latched position, and wherein, when the latch rotates from the initial position to the fully latched position after receiving the  
10      engagement member, the door is moved to the fully closed position;

          an urging member, which urges the latch toward the initial position;

15      a ratchet, which is urged toward the latch, wherein, when the latch reaches the fully latched position, the ratchet engages with the latch to hold the latch at the fully latched position;

20      an actuation mechanism, which separates the ratchet from the latch to disengage the ratchet from the latch, wherein, when the ratchet disengages from the latch, the urging member returns the latch from the fully latched position to the initial position such that the engagement member disengages from the latch and the door moves from the fully closed position to the released position;

25      a motor, which drives the actuation mechanism;

          a controller, which controls the motor; and

30      a detection device, which detects that the door is located at a predetermined position separate from the released position in the door opening direction, wherein the controller maintains the motor in a stopped state such that the actuation mechanism holds the ratchet at a position at which the ratchet cannot engage with the latch after the ratchet disengages from the latch, unless the detection device detects that the door is located at the predetermined position.

12. The door closer as set forth in claim 11, wherein the controller controls the motor such that the actuation mechanism disengages the ratchet from the latch in accordance  
5 with an external instruction.

13. The door closer as set forth in claim 11, wherein the actuation mechanism includes a rotary body driven by the motor and a rotational position sensor that detects a rotational position of the rotary body, and the controller controls the motor in accordance with the rotational position of the rotary body detected by the rotational position sensor.  
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14. The door closer as set forth in claim 13, wherein the rotational position sensor includes a conductor that is located on the rotary body to form a predetermined conductive pattern on the rotary body and a plurality of contact elements that contact the conductive pattern, and the controller determines the rotational position of the rotary body in accordance with signals from the contact elements.  
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15. The door closer as set forth in claim 11, wherein the detection device is a contact type switch.

25 16. A door closer that holds a door at a fully closed position by engaging with a prescribed engagement member, wherein, when the engagement member is disengaged from the door closer, the door moves to a released position that is located slightly separate from the fully closed position in a door opening direction, the door closer comprising:  
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a latch, which engages with the engagement member, wherein the latch rotates between an initial position at which the latch receives the engagement member and a fully latched position, and wherein, when the latch rotates from the initial

position to the fully latched position via a latching start position between the initial position and the fully latched position after receiving the engagement member, the door moves to the fully closed position;

5       an urging member, which urges the latch toward the initial position;

      a latching ratchet, which is urged toward the latch, wherein, when the latch reaches the latching start position from the initial position, the latching ratchet engages with 10 the latch to rotate the latch to the fully latched position;

      a holding ratchet, which is urged toward the latch, wherein, when the latch reaches the fully latched position, the holding ratchet engages with the latch to hold the latch at the fully latched position;

15       an actuation mechanism, which separates the latching ratchet and the holding ratchet from the latch to disengage the ratchets from the latch, wherein, when the ratchets disengage from the latch, the urging member returns the latch from the fully latched position to the initial position such 20 that the engagement member disengages from the latch and the door moves from the fully closed position to the released position;

      a motor, which drives the actuation mechanism;

      a controller, which controls the motor; and

25       a detection device, which detects that the door is located at a predetermined position separate from the released position in the door opening direction, wherein the controller maintains the motor in a stopped state such that the actuation mechanism holds each ratchet at a position at which the 30 ratchet cannot engage with the latch after the ratchets disengage from the latch, unless the detection device detects that the door is located at the predetermined position.